Making Access Happen For better healthcare around the world

CHALLENGE
Ensuring universal healthcare

THREAT
Facing antibiotic resistance

DISCOVERY
Winning ideas for better health

HOPE
Treating children with cancer

SANDOZ A Novartis Division
Dear reader,

Earlier this year I had the privilege of meeting the six teams of young people selected as finalists for the inaugural Sandoz Healthcare Access Challenge, or Sandoz Hack for short. Each of these teams had identified a problem affecting their local community and come up with a potential solution. You can read more about the competition, and the ideas and people behind them, in this magazine.

The reason I wanted to call this out is because it relates to something we can all recognize: Access to medicine is a challenge anyone can face. It’s not specific to developing countries. Developed countries also suffer access issues, even if they don’t always recognize them as such. These challenges don’t take one form. Last year, we researched this topic. Our survey of twelve countries in five continents identified access to medicine, medical information and healthcare system capacity as three fundamental areas where people perceive problems. And it’s not a problem that one company, government or organization can solve. Universal access to healthcare, arguably, is still the single largest unmet medical need and requires a major effort across sectors, institutions and people.

As I sat with my fellow judges at Sandoz Hack listening to the finalists’ stories of challenge and innovation, it reminded me of a simple fact. Despite the vital role Sandoz plays in increasing access to medicines through the medicines we make and the social ventures we’ve developed, we can’t solve the problem alone. We need to continue working with stakeholders across the board to make a difference to as many people as possible.

Sandoz Hack is one way we are doing this. It helps us identify and support innovative ideas that will increase access to medicine for people and communities. Online, we run the #MakingAccessHappen platform. This is a dedicated area on the web for us to talk about the variety of topics that make up and affect access to medicine. And this magazine is another way. In this, our first edition, it is an opportunity to tell the stories of those people who are making access happen. In future editions, I want it to be a place for everyone with an interest in access to medicine to read about and contribute to addressing this complex issue.

So if there is a story you think we should tell, or if you’d like to contribute an article, please get in touch. Email editor.makingaccesshappen@sandoz.com for more information.

Richard Francis, CEO, Sandoz

“Universal access to healthcare requires a major effort across sectors, institutions and people.”
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**Cover:** Scheharazade Del Rosario and her baby, Precious Jewel, seek help at Southern Philippines Medical Center in Davao City, Philippines. Read more on page 6.
Two young patients with cancer in the Philippines have reason to hope: They are among the children now receiving care.
“Childhood cancer is highly curable. You cannot prevent it, but with early detection and treatment, chances of survival are quite high.”

Dr. Mae Dolendo, Lead Pediatric Oncologist at Southern Philippines Medical Center in Davao City
A science and an art – treating children with cancer

Mae Dolendo, M.D., is the lead Pediatric Oncologist at Southern Philippines Medical Center, Davao City. She has set up cancer-care clinics across the entire island, bringing therapy closer to patients in need.

Every time pediatric oncologist Dr. Mae Dolendo has to tell parents that their child has cancer, she makes a promise – one she has never broken. She promises the family that she and her team at Southern Philippines Medical Center in Davao City will do their best. Of course, most doctors would offer those words. But for Filipino children with cancer, she is, perhaps, their greatest hope. Too few treatment centers exist on the island of Mindanao. She has made it her life’s work to change this.

Cancer treatment is both a science and an art, explains “Doc Mae,” as her patients call her. The science part includes diagnosis, treatment methods and patient management. But the real art of oncology is caring for patients and connecting with people, because cancer treatment requires a long-term relationship between patient and physician. “Your patients stay with you for years. You care not only for the kid but also for the family that brings their child to you. It’s a relationship and a journey that is not common in other medical disciplines.”
Island logistics
Dolendo’s promises include creating oncology therapy where there is none and bringing care closer to patients. In the Philippines, seeking specialist medicine usually means a long journey. The country has over 7,100 islands, with a combined population of more than 100 million. Manila, the nation’s capital, sits on the largest island, Luzon. Mindanao is the second largest island, bigger in size than Austria, and home to nearly three times as many people, about 25 million. Yet the terrain of the island country presents a logistical nightmare for families of children with cancer. There are only about 40 pediatric oncologists in the entire country, many of them in or near the capital.

Doc Mae says 80% of her patients come from across Mindanao and neighboring islands. She recalls one child with widely spread tumors throughout his body and lungs. He was in great pain and had to be carried in a hammock. To get to the mainland from their island, the family had to cross the sea, then travel by bus for several hours to Davao. “Even if you are well, you will find the journey tiring,” says Doc Mae. “For a child who is sick, in pain and bleeding, it is a lot of suffering.”

Such cases illustrate why the islands need satellite clinics that can offer therapy closer to the patient’s home, says Dolendo. “This patient was already in late-stage disease, and when the child wanted to go home, we found a closer satellite that could offer palliative care.” World Child Cancer (www.worldchildcancer.org), a UK-based charity that works to improve the lives of children with cancer in low- and middle-income countries, supports Dolendo’s program. Sandoz provides financial assistance for training local staff.

The Sandoz Philippines organization is also engaged locally with World Child Cancer and supports Doc Mae in her efforts to increase medical capacity. For example, an internal associates awareness event resulted in additional donations to World Child Cancer, benefitting Doc Mae’s work to establish satellite medical centers in rural areas. “The healthcare system encourages people to come to big cities, meaning the number of specialists in the more remote regions is incredibly low,” says Kuntal Baveja, Cluster Head and President, Sandoz Philippines.

“Our goal is to make sure more and more people do not needlessly suffer. It is initiatives like this that will make a difference, bringing together awareness and the know-how, and having a clear, beneficial impact in the end. I am very proud of our collaboration with World Child Cancer.” Some satellite clinics also offer “Houses of Hope,” temporary homes for parents and children on outpatient treatment, which provides activities and school education for patients who are receiving long-term treatment. Satellites also offer Child Cancer Awareness and Education campaigns because a child’s chances of survival are much higher when cancer is diagnosed early.

A caring career
Dolendo’s journey to pediatric oncology began at a young age. “Ever since I was nine, I told everybody I wanted to be a doctor – and I always keep my promises,” she laughs. But tragically, when she was 17, her mother

Keeping promises
Improving access to oncology care in the Philippines

2004 Dr. Mae Dolendo became first practicing pediatric oncologist on the island of Mindanao, Philippines. She managed the treatment of 35 children with cancer.

2007 First of five “House of Hope” homes opened for parents of children with cancer. These facilities offer families a place to stay during a child’s (often lengthy) treatment.

2009 Partnership with World Child Cancer began. First of five satellite clinics across Mindanao opened, each offering two to ten beds for childhood cancer patients. Clinics have been supported financially by Sandoz since 2015.

2016 Treatment capacity increased to 300 children with cancer in the program’s clinics. New Southern Philippines Medical Center Cancer Institute was inaugurated in December, with 50 new beds for children patients.
The odds of surviving childhood cancer in low- to middle-income countries such as the Philippines are much worse than in developed countries. Doc Mae has dedicated her life to changing this outcome.

BonBon is being treated by Doc Mae at Southern Philippines Medical Center. He did not seek medical treatment for his advanced tumor until a very late stage.

Joy sought medical care only after the cancerous tumor in her knee was so big she could hardly walk. As a result, her leg had to be amputated.
died of breast cancer. As painful as the experience was, Dolendo believes it has made her a better doctor. She can empathize with patients and families. Palliative care, or pain management for the terminally ill, is meaningful: “I saw my mother suffer, and I don’t want that to happen to my patients.”

After training in pediatrics, Dolendo relocated to Singapore with her family, where she specialized in pediatric oncology. Yet she was determined to return to Mindanao in the Philippines. At that time, she says, conditions were heartbreaking. Because children with cancer were often put in hospital beds next to patients with diarrhea or pneumonia, many died of infection rather than cancer. She found it very frustrating, she says, because in Singapore she had seen kids beat cancer, and she knew it was highly curable.

Hope and hurdles

Even in the hardest of times, or when clinic staff run out of medicines for their patients, they never run out of love for them, Doc Mae told members of the United Kingdom’s House of Lords in late October 2016, where she and members of World Child Cancer had been invited to speak. Her words added emotion to the statistics.

Dolendo said that as disheartening as a cancer diagnosis may be, it is the first step toward treating the disease. Many families do not know much about cancer nor recognize its signs. Through the work of the World Child Cancer organization, dozens of young patients from across Mindanao are alive today. This is about half of those diagnosed with cancer, she added, up from roughly 10% a few years ago.

Nurses and oncologists from Cameroon and Ghana, also present at the House of Lords event, said getting medicines and educating families are big hurdles in their countries also. Their patients also must travel long distances for oncology care and often have no place to stay. But the efforts by the World Child Cancer organization are showing results. Lorna Renner, M.D., Head of the Pediatric Oncology Unit in Accra, Ghana, says she convinced her government to fund children’s cancer treatments based on the program’s success.

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**Childhood cancer**

A few facts

**Worldwide**

80–150 of 1,000,000 children become ill with cancer globally.

+200,000 new cases per year

100,000 children in developing countries are dying every year.

**In developed countries**

~ 50,000 new cases per year

80% survival rate

**In developing countries**

~ 150,000 new cases per year

10–20% survival rate

At least 50% of the children who did not survive could have been cured with standard therapy drugs.

**The key problems**

- Lack of awareness of the curability
- Too little expertise/too few resources
- Lack of access to treatment

Child mortality from cancer is increasing.

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Children with cancer and their parents have better access to acute care and palliative therapy because of the Sandoz partnership with the World Child Cancer organization.
By recognizing the vital role of family members, Doc Mae has created a unique support system.

**Beating cancer**

Most of the world’s children live in developing nations, where cancer treatment is only beginning. The Philippines has a very young population, Dolendo points out, with about 35 million children aged 14 and under. About 3,500 children every year are diagnosed with cancer, with 1,000 of them in Mindanao. She hopes that her pediatric oncology efforts, supported by the World Child Cancer organization, can serve as a model in the Philippines and among other Asian countries. This will give more children in the even larger populations of Indonesia, China and India the chance to beat cancer. “If you achieve 40 or 50% improvement in survival rates in Asia, just imagine how many children you’re going to be saving!”

Most of Dolendo’s patients come from very poor families who often cannot even feed their children or send them to school. Being able to treat cancer among these families is just short of a miracle, she says. “I’m happy that my life’s work has yielded better circumstances for marginalized children with cancer.”

During her medical studies in Singapore, the “amazing” pediatric oncology team at the university hospital inspired Dolendo. “They were really good at both the science of medicine, and at the art of taking care of children. I wanted to be just like them.” And has she succeeded? With a buoyant laugh, Doc Mae exclaims, “Yes! I have become the kind of doctor I wanted to be.”
Viewpoint

Saving the lives of children

The World Child Cancer organization works to improve access to care for children with cancer in lower-income countries. They identified five reasons why essential medicines do not go to where they’re needed.

1 Accessibility
In lower-income nations, nearly nine in ten children with cancer die although relatively low-cost medicines could cure them. Many factors play a role, but our survey investigated why medications are not getting to where they are needed. More can be done to improve consistent access to affordable medicines of reliable quality for curative, supportive and palliative care. These drugs are basic, off-patent, mostly generics, and all are listed on WHO’s List of Essential Medicines for Children.

2 Availability
The nine countries in the survey (Bangladesh, Cameroon, Colombia, Ghana, Malawi, Myanmar, Philippines, Tanzania and Zambia), import childhood cancer drugs, but procuring and importing drugs for treating highly curable malignancies is often unreliable. Reasons include inadequate worldwide production and distribution, failure to renew import licenses on time, underestimating demand, and/or that needed drugs are not on the national list of essential medicines. If not listed, they are less likely to be imported.

3 Affordability
None of the countries surveyed offer universal health coverage. Financial assistance included philanthropy, subsidies from NGOs or charitable groups, or partial public health insurance schemes. In countries with subsidies for medicines, fewer than five percent of families abandoned treatment. Despite comparatively low costs, over 20% of families had to stop treatment because they could not afford it. Where families are living on two dollars a day, drugs costing one dollar a day are not affordable.

4 Adequate quality control
Even more worrying is the quality of drugs in the countries surveyed. The origin of the medication was not known in every case, but all of the doctors expressed concern about quality. In parts of Africa and Asia, between 50–70% percent of imported medicines are declared to be ineffective, fake or counterfeits. Some doctors reported lower effectiveness and higher toxicity of the medicines than expected despite using well-documented successful therapeutic protocols.

5 Awareness
In lower-income countries, people are often not aware of children’s cancer. We can assist by developing programs for families and professionals about signs and symptoms of cancer. And we need to build on international partnerships that can provide training and financial support. We know what to do. It’s time to act. We can start to reduce the 80,000 deaths each year in childhood from cancer in lower-income countries. Children are the future. Saving their lives is crucial.

Authors

Tim Eden, Founding Medical Trustee of World Child Cancer, Emeritus Professor of Paediatric and Adolescent Oncology, University of Manchester, UK

Elizabeth Burns, Head of Programmes, World Child Cancer, London, UK

Further reading: “Are Essential Medicines Available for Childhood Cancer in the Developing World?” by Prof. Tim Eden and Elizabeth Burns
Good Manufacturing Practices ensure product safety, a critical part of the pharmaceutical supply chain.
“Getting medicines to patients requires a hugely complex transport effort. The priority is on process reliability and safety.”

Prof. Dr. Martin Woelker, University of Applied Sciences in Kaiserslautern, Germany
During the entire pharmaceutical production and delivery process, stringent regulations, such as maintaining strict hygiene standards, have to be followed.
Getting medicines to patients

The stringent requirements on pharmaceutical product security and stability are served by a highly complex logistical chain. When used efficiently, it can bring down overall healthcare costs.

Getting medicines to patients requires a hugely complex transport effort – and lives can be at stake if anything happens less than perfectly. As a result, medical shipments are governed by a unique set of rules. To protect patients from unsafe medical products, the World Health Organization says it is critical that “no weak link exists in the supply chain.” Transport and storage must demonstrate an unbroken series of steps. Making sure that this access to safe and stable medicines happens is what Scott Allison’s team does best.

As president of Life Sciences and Healthcare for DHL, the leading logistics service provider in the world, Allison and his division ensure that every medicine, from a simple tablet to a complex infusion, completes its journey safely and on time. Ensuring that delicate pharmaceuticals are handled with the utmost care is part of Allison’s daily business. Transporting biologics, for example, is no easy task. Each shipment of these specialized medications, which are produced using living organisms, is highly fragile, requires a strict temperature range of two to eight degrees Celsius and
can be worth up to USD 50 million. And it’s not just the medicines themselves that can be costly. Although logistics is only one step in the pharma supply chain, these shipping processes can represent nearly 40% of total operating expenses.

To guarantee that all medical cargo arrives safely and reliably, the strategic teams in Allison’s department monitor each shipment until it reaches its destination, whether it’s a distribution facility, a hospital or doctor. Before the journey, they map out every step, anticipating any problems. They coordinate trucks, freight trains, airplanes and even individual couriers to meet with manufacturers, customs offices and regulatory agencies that differ by region and nation. They monitor every movement and then analyze performance efficiency. And all of these processes repeat day and night, in more than 200 nations around the world.

**A truly global challenge**

From his office in Dallas, Texas, Allison outlines one of the key challenges: “In the old days, medicine was produced in a factory next to the distribution center, which was close to the patient. Everything was local. But as production networks have become more global, those supply chains have become more complex. Companies have to absorb transport costs and logistics
organization but still deliver the same product efficacy and safety.” Handling this global network expansion without compromising on the quality of medicines is a substantial challenge.

Modern pharmaceuticals follow two key control processes. Good Manufacturing Practices (GMP) help to ensure product quality, with a defined process for each medicine. GMP aim to guarantee that a product is of the highest quality when it leaves the warehouse and enters the supply chain. Allison continues, “We also have to follow Good Distribution Practices, or GDP, to ensure the integrity and security of the product all along the way. For pharmaceutical companies, these GDP requirements are highly controlled under corporate compliance.” A further challenge, he adds, is that GDP vary by region. “The same goods may pass GDP in one region, such as Latin America, but have to meet other requirements for the UK.” Since global requirements have to be factored into the whole route, the process grows in complexity.

Reducing supply chain costs to improve access

Good Distribution Practices are among the wide range of requirements placed on pharmaceuticals, and this leads to concerns about whether the supply chain is cost-effective. Allison and others believe that processes may need to adapt. “In the technology field, where I began my career, we understood the early strategic importance of supply chain practices. In pharmaceuticals, there’s been less attention to this for a variety of reasons. No one wants to make it seem like medicine is only about ‘the bottom line.’ But without making the supply chain more effective, medicine is too costly to produce or obtain.”

To Allison, the overall pharma supply chain has a number of opportunities to reduce costs. Technology is offering new ways to coordinate tasks. “Just five years ago, there was one temperature sensor, and another would track the location, stability and so on. Now one sensor can measure all of this and make many other control measures, for a fraction of what it used to cost.”

Mobile and radio-based satellite systems, along with technology like GPS, are constant companions as the products travel. This ability to tag and fully monitor a product through its life cycle is a crucial asset, Allison says. He also sees opportunities for less sensitive medicines: “These can be moved via slower methods, say ocean shipping instead of airplanes, so we can increase loads and lower costs. Saving money here offsets the cost of more critical journeys and sensitive medicines. Overall, we can innovate ways to extend transportation time to markets, which will reduce costs while maintaining quality.”

Allison suggests consolidating the number of people who oversee the process and more strictly defining their responsibilities for less overlap – practices that are common in supply chain management for other fields. Ultimately, Allison envisions that developing nations could lead improvements in the process. “Take a
country like Angola, or the Republic of Congo. The infrastructure isn’t as firmly developed, and it’s too costly to imitate the infrastructure and the type of consumption typical elsewhere. There, they can look more pragmatically and say, ‘It may be more cost-effective to enable e-commerce, or direct delivery to the patient or doctor, rather than create a longer series of logistical points.’”

Allison compares this approach to the business model for e-retailer Amazon: supplier consolidation, central distribution and an IT-based demand platform, serving as a channel for sellers – but with the model adapted for medicines. Developing possibilities like these, says Allison, to transform business and improve access to medicines, is what keeps him motivated.

Allied visions
Someone who can speak to the challenges and opportunities of developing regions is Miroslav Tukaric. Based in Slovenia’s capital of Ljubljana, Tukaric serves as Novartis Head of Regional Supply Chain Management Central and Eastern Europe, the Middle East and Africa.

Like Scott Allison, Tukaric has a foundation in IT. Fourteen years into his work in supply chain management, Tukaric explains the complexities of his role. “On the one hand, it is all about supply and demand. But we have to add in medical need,” he says. “And in working with developing nations, or in nations where the infrastructure is less than ideal, we have to pay close attention to ensure that the medicine’s quality is not affected under these circumstances.”

Tukaric is experienced with unique logistical situations: “People can say, ‘If we need to send medicines to destinations far away from the manufacturing sites, let’s go by plane.’ But it’s more complex than this, and it’s not only about the costs. If you need to secure the cool chain, it can be really tricky to go with a plane. Direct sunshine might start heating the goods, and this could be hard to control at the airport before loading onto a plane. Sometimes this is much easier to control when we ship by sea. When it comes to speed, of course, that’s different. But speed doesn’t matter if we can’t fully secure the requested quality of the medicine.”

Improving coordination
In the Middle East and Africa, specifically, with more than 60 countries and an extremely fragmented pharmaceutical market, pharma supply chains face additional challenges. Tukaric’s responsibilities include analyzing the climate and geopolitical factors, as well as monitoring emergency situations. With so many topical concerns, Tukaric sees the potential for tighter coordination: “There are synergies where companies and patients can benefit in the end, if properly planned.” Like Allison, Tukaric also anticipates how Amazon’s business model can be adapted to different parts of the pharmaceutical supply chain. “Consolidating our efforts like this also means we can absorb losses and lower profits for some routes and medicines, because we have a base level of profits from others.”

“The questions for pharmaceuticals are: Who needs to be in the process – to maintain product security and stability, and patient safety – and where can we consolidate our tasks so that patients can get their medicines efficiently.” Tukaric is confident that even small changes can have a tremendous impact: “All of us are already looking for better ways to do this. We must.”

Depending on the urgency, medicines are sent by plane or ship, but delivering an intact product has priority.
Prof. Dr. Martin Woelker teaches Logistics Diagnostics and Design at the University of Applied Sciences in Kaiserslautern, Germany, where he specializes in optimizing logistics systems.

What makes the pharmaceutical supply chain special?

Logistics are based on six main objectives: deliver the right product, at the right time, to the right place, in the right amount and the right quality, at the right costs. Logisticians usually try to save money by being as efficient as possible. In pharmaceutical logistics, the priority is on process reliability and safety. Everyone involved in the supply chain has to guarantee delivery of entirely intact products into the patients’ hands – cost is often considered secondary to this. Also, a high density of regulations makes this market very complicated.

How efficient is the movement and distribution of goods?

Not as much as it could be. In pharmaceutical logistics, outcome clearly stands above efficiency – the main focus is not on costs. This is very different from all the other fields I know. Sometimes people require access to their medicines immediately, so we deliver to pharmacies several times a day, regardless of storage and transportation costs, or distribution methods. Clearly, there must be a better way.

Why is it so difficult to make changes in processes?

Modifications are usually rejected with the argument, ‘The existing logistics processes are about the patients’ well-being.’ That is true, no question. But I believe we need a neutral, open debate about how to improve delivery, or we are all going to pay a high price, either out-of-pocket or through increasing insurance premiums. By switching to a process view to create greater efficiency, we will not only reduce the logistics costs for medicines but, ultimately, contribute to the sustainability of the healthcare system. And in doing so, we will best serve the needs of patients.

Are there ways to make the pharma supply chain more cost-effective?

The business needs efficiency and transparency, as in any industry. In free economies, the customers decide which product they want. There is a difference in the pharmaceutical market. While patients need their medication and therefore have no choice but to buy what was prescribed for them, they are also customers who should get products in the most cost-effective way. It’s important to optimize all the small logistics movements we make thousands of times a day because, here, seconds count and add up to significant savings in time and cost. Also, we cannot change the distance between manufacturer and patient, but we can think about the many steps in between. If we improve the logistics process, we also minimize the probability of mistakes. In this way, security standards increase while costs decrease, which is a win-win situation.

Interview

Seeing patients as customers

Efficient pharma logistics can save lives and improve cost-effectiveness.
A community healthcare worker performs a rapid test for malaria on a young mother. In the Chongwe district in rural Zambia, people don’t have regular access to medical services.
“Having the right therapy for the patients who need it, whenever they need it and wherever they are. This is how we can make access happen.”

Richard Francis, CEO Sandoz, in a keynote speech at the eyeforpharma conference, 2017
Access matters on a global scale

Limited access to healthcare poses a significant barrier to long-term social and economic development around the world. However, multilevel approaches are bringing progress. A Sandoz view.

Every year, one million children fall ill with tuberculosis, and 200 million people develop malaria. Although these diseases are preventable and treatable, they cause two million deaths annually. Some 14 million people are newly diagnosed with cancer yearly, with varying chances of survival. With early treatment, childhood cancer is particularly curable. In high-income nations, eight out of ten children with cancer recover. However, in lower-income regions of the world, only two in ten children survive.

The global burden of diseases such as these has different facets. The international community faces a double challenge: Significant parts of the world’s population – almost two billion people – lack access to basic medicines. Some 400 million people have no access to healthcare at all. Indeed, access is a universal issue and is not limited to low- or middle-income nations. Some countries have sophisticated healthcare systems, yet many patients must finance essential medical services or pay for medicines out-of-pocket.
Availability of medical services is commonly linked to their cost at local, regional, national or international levels. Expenditure on healthcare per person varies widely between countries; however, healthcare costs continue to rise virtually everywhere. In general, greater healthcare spending means that more nations are able to provide a range of healthcare services to their populations. However, if current trends continue, global spending will increase to USD 13 trillion in the coming decade, which may make providing comprehensive medical services unsustainable for national healthcare systems.

At the same time, the world’s population is projected to grow to about 9.7 billion people by 2050. And as the world’s population is increasing, global life expectancy is also on the rise. Within the coming years, one in five people in the world will be age 60 or older. But as people age, they are more likely to develop noncommunicable diseases such as hypertension or diabetes. Additionally, the elderly tend to require more frequent and longer hospital stays. Greater numbers of seniors will also need treatment and care for mental health issues. Conditions such as these are likely to add long-term financial pressure to healthcare systems, families and individuals.

Universal access to healthcare, as well as the rising costs of healthcare for the growing and aging population, are among the major global challenges that we at Sandoz have identified based on a comprehensive survey we commissioned. To address these pressing issues, we have developed a range of strategies: See the following pages for more.

**Growing and aging world population**

Reported and projected world population (in billions), and percentage of population over 60

**Global health expenditure**

1995–2014 (in USD trillion) and projected outlays

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Source: 2025 data, Business Monitor International / BMI Research report, 2013*
For insights on the most pressing issues and trends, Sandoz commissioned a study in 2016 on global access to healthcare. This analysis includes a public opinion survey of 6,200 individuals and nearly 400 healthcare professionals in 12 middle- to high-income countries. The results have helped us to better understand global healthcare issues and evaluate approaches for change. Backed by our research, we have developed a model to drive our access to healthcare strategies and guide our activities. The data have led us to categorize global health challenges into three distinct areas. We believe that all societies need to increase access to medicines, build medical capacity and improve access to medical information. We also believe that each pressing issue demands a multifaceted, multilevel approach. As a pharmaceutical company, we see ourselves as part of the global community and as part of the solution.
Increase access to medicines

People in high-income countries as well as in low-income nations perceive difficulties in accessing the medicines they need. Access can take various forms and can be improved through a range of approaches. Novartis and its division Sandoz have developed a range of pioneering approaches and their own work in this area:

Partnering with healthcare organizations
Sandoz partners with the UN to help avoid millions of preventable deaths from pneumonia in developing countries. Sandoz has delivered more than 500,000 treatment courses of WHO-preferred medicine for pediatric pneumonia to UNICEF.

Developing multilevel programs
Nearly half of the world’s population are at risk of malaria. The Novartis Malaria Initiative has provided more than 800 million treatments since 2001. This multilevel program combines access to medicines with research and development, and capacity building.

Another group-wide initiative, Novartis Access, expands access to our medicines in lower-income countries. The program provides 15 medicines addressing key noncommunicable diseases such as cardiovascular diseases, diabetes, respiratory illnesses and breast cancer.

Driving use of generic medicines and biosimilars
Generic medicines allow healthcare systems to provide more patients access to medicines for less money. Generics are equivalent to brand name drugs in quality and performance. In the US alone, 80% of prescriptions are for generic drugs – which saves roughly USD 3 billion every week, according to the US Food and Drug Administration.

Similarly, biosimilar medicines match their reference biologics in terms of quality, safety and efficacy to reference biological medicines. Through the use of biosimilars, healthcare system savings in the EU and US could reach EUR 49 to 98 billion, according to the industry association Medicines for Europe.

Have you ever experienced difficulties in accessing the medicines you need?

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Source: Sandoz Healthcare Issues Perception Study 2016
Medical capacity building ensures healthcare professionals can keep their expertise up to date.
**Build medical capacity**

Nearly 400 million people around the world lack access to healthcare. In rich and poor nations alike, millions of people lack access to essential health services. This can occur when national systems are not able to cover overall medical costs, leaving payments to come from out-of-pocket expenses that can drive individuals into bankruptcy or poverty. In some nations, healthcare professionals need more training. Sometimes the systems are unable to provide people with the medicines, medical information or capacity to deliver needed healthcare.

**Providing universal health coverage**

Whatever the reason, the outcome is the same: Patients cannot access essential health services. Providing universal health coverage worldwide – which could be a reality in the coming years – is, for many experts, the key to providing the solution.

According to the World Health Organization, universal health coverage means that all people receive health services such as health promotion, disease prevention, treatment or therapy, hospital care and pain control without suffering financial hardship. In recent years, the universal health coverage movement has gained momentum globally, with key organizations such as the World Health Organization, World Health Assembly, World Bank and the United Nations General Assembly calling on countries to urgently and significantly scale up efforts to accelerate their progress towards universal access to affordable and quality healthcare services.

**Supporting local efforts for better medical care**

In practice, the focus on universal health coverage is bringing significant results. More than 100 low- and middle-income countries, home to three-quarters of the world’s population, are taking steps in this direction. In addition to the major systemic initiatives, access is also increasing through smaller, local initiatives. In many regions, health policy increasingly focuses on local efforts to improve medical services, such as making births safer for women and children in sub-Saharan Africa. Sandoz supports midwife training in Ethiopia.

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**Do you think medical education needs to improve among healthcare professionals?**

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<thead>
<tr>
<th>Country</th>
<th>General public agree</th>
<th>Healthcare experts agree</th>
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Source: Sandoz Healthcare Issues Perception Study 2016
Medical information is a great need. Patients trust a doctor’s advice, but they also want to learn about therapy benefits, risks and alternatives.
**Improve medical information**

Nearly three out of four healthcare experts perceive access to medical information as low. The Sandoz 12-country survey revealed that a majority of healthcare experts and members of the public would like to know more about illnesses, medicines and treatments. In some cases, not enough information is available. However, access to information is also considered low when the information is unreliable and when an oversupply of information makes it inaccessible. Patients as well as healthcare professionals see the need for greater access. Here are some scenarios, along with strategies for change:

**Offering better access to medical information**

Patients and healthcare providers in low- to middle-income countries often have limited access to medical information. International initiatives and partnerships support change, including exchanges between European and local healthcare professionals, and they support specific, condition-related collaboration. For example, the Sandoz-run program Breathe Africa provides medical students with training to diagnose asthma. It also offers patient education.

Many patients turn to the internet for medical information, but there is a risk that they might not recognize what is accurate and reliable and what is not. Patients want and need to understand the details of their illnesses and treatment options. One best practice case for improving access is The Information Standard, a platform operated by the National Health Service in England, which offers certified and verified medical information.

**Increasing access through mobile technology**

Technology is also showing promise as an enabler to increase access to healthcare. For example, telemedicine – medical contact through mobile phones – has the potential to bring health services and advice to more people than ever before. The widespread use of mobile phones, particularly in low- and middle-income regions of the world, allows patients to monitor their own health conditions and to receive expert advice and instruction in disease prevention and therapy.

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**Do you think there is a need for more information about benefits and side effects of medical treatments?**

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<tr>
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Source: Sandoz Healthcare Issues Perception Study 2016

These are just a few examples of ways to make access happen: capacity building, to make certain that medicine and treatment are available where they are needed; and access to medicine, to fight the world’s most deadly diseases; access to medical information, to improve treatment choices and ultimately to prevent illnesses in the first place.
Winning ideas for better health

Look behind the scenes at the 2017 Sandoz Healthcare Access Challenge to meet the three winners and learn how they plan to improve healthcare access in their countries: Ghana, Maldives and Philippines.

How do you define a leader?” As Richard Francis, CEO Sandoz, asked this question, he was looking into the faces of a dozen young entrepreneurs. “A leader is someone you are willing to follow,” he said simply. Then he surprised his listeners by adding, “I’d follow every one of you – and I’m really looking forward to the journey.”

Francis wasn’t alone in recognizing leadership qualities in the finalists of Sandoz HACK – Healthcare Access Challenge, a competition that asked young people between ages 18–35 to submit ideas for better health using mobile technology. The six finalist teams came from Germany, Ghana, Maldives, Pakistan, the Philippines and South Africa. In March 2017, the teams presented their solid business proposals to an expert judging panel, who selected three winners. So who were the Sandoz HACK winners and what were their ideas? We captured a glimpse of their personalities and their plans, along with their passion for making access to healthcare happen.

Playful minds find donor solutions in the Maldives

Gazing at a travel poster showing turquoise-blue ocean waters, 26-year-old Mohamed Shuraih says, “I love the sea. But with climate change, the Maldives could be under water within ten years.” Shuraih cares – about nature, about his home, and about people and their well-being. He might not know how to rescue his home country’s island atolls, but he sure does have a plan to help Maldivians who suffer from Thalassemia and need regular blood transfusions for treatment. Thalassemia is an inherited blood disorder that affects hemoglobin production, the protein in red blood cells that carries oxygen throughout the body. He is producing an app to offer incentives for people to give blood and to manage blood donations. Shuraih – using last names is common in the Maldives – is a tinkerer. So Shuraih says he likes to “play around” with computers and now works as a software developer without having studied computer science.

Shuraih lives with his family, who is not shy about asking when he and his girlfriend will get married. “Our parents have been encouraging us to take the tests needed,” he smiles. In the Maldives, this means Thalassemia tests. Of the country’s roughly 400,000 people, close to 20% are Thalassemia carriers.

Patients usually keep a personal blood donor list with names of half a dozen people. They or their relatives must juggle who can donate when, scrambling to cover unexpected absence, vacations or illness. “People post on Facebook or Twitter, sometimes from the hospital and ask:

“People post on Facebook or Twitter and ask: ‘Who can donate blood?’ Sometimes they’re messaging from the hospital. It’s something people shouldn’t have to do.”

Mohamed Shuraih, Blood Drive, Maldives
‘Who can donate blood?’ It’s something people shouldn’t have to do.” But it’s only these urgent messages that can save the lives of their partner, or their child, at present.

For the blood-drive app project, Shuraih partnered with fellow software developer Yameen Rasheed (†). At the awards ceremony, Yameen and Shuraih spoke about their plans for the project. Yameen said, “Our country is actually a very small community, so just two people can make a significant impact on a national scale. We’re really happy to be among the winners of Sandoz HACk. Now the real work starts, to change the lives of Maldivians with Thalassemia.”

The idea: Blood Drive
An app to incentivize blood donations in the Maldives, with redeemable points, badges and rewards such as retail gift cards. It aims to create a central registry of blood donors and their blood type, and connect donors and potential recipients. The app will also list donation centers and send push notifications in emergency situations. This solution will help people with Thalassemia, a blood disorder affecting hemoglobin production, which leads to the need for regular blood transfusions.

From mythical cures to mobile connections in Ghana
Noticing the lack of any type of pharmacy in one Ghanaian village, pharmacist Elvin Blankson asked the villagers how they treat stomach problems. He was shocked by the answer: “We throw water onto the roof of a building, catch the water that dribbles down the building in a cup and drink it.” Hearing this, Elvin became determined to bring modern medical advice to remote areas of his country. This 32-year-old from Accra, Ghana, is developing a mobile application that lets pharmacists supervise rural facilities and clinics.

“There is a lot of work to be done, and we’re in a hurry to get started. I want to help Ghana’s rural areas in treating common diseases. Winning this prize has put us much closer to making this dream come true.”

Priscilla Abu-Darko, GoPharma, Ghana

Based on his six years of work as a pharmacist, and driven by his own love of mobile technology, Elvin is combining pharmacy with phones to bring better healthcare to regions that, in some cases, still rely on mythical cures. As he sees it, the main problem is the lack of pharmacists outside of cities, and this means that some drugstores are staffed only by medical-counter assistants. “Nobody is willing to move to rural areas of Ghana, so patients hardly get to see a professional pharmacist or doctor.”
Priscilla Abu-Darko, GoPharma, Ghana
When he is not busy optimizing healthcare services, Elvin enjoys watching Manchester United. The English football club plays in one of the world’s most famous stadiums, Old Trafford, nicknamed Theatre of Dreams – which is a perfect fit for Elvin. “I like dreaming about how the future might look,” says Elvin.

Elvin is also an extremely hard worker. During a Commonwealth scholarship year at Nottingham University, UK, for his master’s program in international public health, he met Lebene Soga. “We share the same passion,” says Lebene, who is also from Ghana, and who matches Elvin in positive outlook and wide smile. Now a sessional lecturer for entrepreneurship at UK’s Henley Business School in Reading, Lebene, 35, stood in for Elvin at the HACk awards ceremony.

Priscilla Abu-Darko, Elvin’s GoPharma partner, is equally vibrant and professional. When visa issues kept Elvin from attending Sandoz HACk in person, Priscilla also represented the team in London. She masterfully demonstrated how mobile technology bridges distances, continuously consulting with Elvin, who was 5,000 kilometers away in Ghana. Priscilla supports GoPharma’s business development. “Technology,” she says with a nod, “That’s what our project is about. It makes the world a smaller place.”

“There is a lot of work to be done,” Priscilla adds. “And we’re in a hurry to get started. I want to help Ghana’s rural areas in treating common diseases. Winning this prize has put us much closer to making this dream come true.”

The idea: GoPharma
An app to link pharmacists with medical counter assistants in rural facilities or clinics. Pharmacists can supervise operations in several locations in real time, offering patient consultations, prescription reviews, advice on medication orders and possible contraindications. This solution aims to bridge the skills gap in rural areas of Ghana, where there is a lack of pharmacists.

Winning hearts and saving lives in the Philippines
Many people have heard of Elon Musk, the creative mind behind Space X, a private enterprise for space travel. One of his fans is Joel Alejandro, who admires how Musk looks to outer space for positive changes in society. Joel, a 21-year-old medical student, also seeks positive change. He is taking action against cardiac arrest. With his app, named “Sali,” he plans to teach cardiopulmonary resuscitation (CPR) to everyone in the Philippines.

“I look up to Musk’s creativity and sheer brilliance in pursuing his vision,” says Joel. He says his closest relatives, too, inspired his career ambitions. His uncle is a medical doctor, and his father is a local politician. Joel often accompanied him on constituent visits. “Going with him through the years opened my eyes to the realities of healthcare problems and their effects on people’s lives,” he says.

“More than 80% of cardiac arrests happen at home, and so most likely it will happen to someone you love. It would be too horrible not to be able to do something to save your mother or your father.”

Joel Alejandro, Sali, Philippines

In the Philippines, these realities include great inequalities, Joel adds. But wealth does not protect anyone from the nation’s number one killer, heart disease. For students, CPR education is mandatory, but the island country has few training centers for the general public. Now in his second year in medical school,
Joel's “ah-ha” moment happened during a CPR class. “It didn’t seem that difficult,” he mused. An irregular player of video games but an avid user of fitness apps, Joel was suddenly electrified. “Suddenly, I realized we could apply the ease and convenience of fitness apps to CPR education!”

People might believe that CPR occurs in public places, with strangers. In fact, it’s more likely to be the lives of family members at stake. “At least 80% of cardiac arrests happen at home, and most likely it will happen to someone you love,” says Joel. “Filipinos are very family-oriented,” he adds, “And we can build on this responsibility to our families. It would be too horrible not to be able to do something to save your mother or your father.”

He speaks with conviction, and he’s clearly passionate about helping people although he says he would consider himself more on the introverted side. But during the HACk workshop, his inner passion shined through his outer shyness. His brown eyes light up. “You know, it’s easy to talk about your project when you really believe in what you do!”

This passion for solving problems is also easy to see in Sali’s team member, Andrea Relucio, 24, who Joel describes as “the outgoing one.” Upbeat, pragmatic and seemingly at ease with anyone, she manages Sali’s business development. Faced with tough questioning from the experts, she turned the tables, asking, “Have you ever done CPR training? Can you remember it?” Her question were met with silence. “It’s okay,” she soothed. “Lots of people need refreshers.”

Later, when thumbing through a magazine, Andrea touched the image of a girl in a Superwoman costume, with her arm stretched upward. “I see myself as that child, full of wonder, fun and discovery,” she beamed, mimicking the stretch. When Andrea and Joel heard they’d won, their spirits soared about as high as they could go. “At the start, we didn’t want to get our hopes up,” says Joel. “Then we got so much encouragement and a lot of help along the way from Sandoz Philippines,” says Joel. “They said ‘we want to help you to win.’ They really believed in us. Now we can make a difference in our community and help to save people through CPR education.”

The idea: Sali
An app to teach cardiopulmonary resuscitation (CPR) in the Philippines. It will teach, motivate and guide anyone to administer CPR effectively with auditory and visual prompts. It also connects users to a network of fellow lifesavers and will notify emergency services in acute situations. It empowers people in case of cardiac arrest, one of the nation’s top killers. “Sali” is a Tagalog word meaning “join” or “connect.”
Sandoz HACk judging panel

Roberto Ascione: Founder of Healthcare International
Fredrik Debong: Founder and CEO of mySugr, an app-based diabetes management system
Richard Francis: CEO Sandoz
Rowland Manthorpe: Health Editor at WIRED magazine
Dr. Harald Nusser: Head of Novartis Social Business, which supports expanded access to medicines in low- and lower-middle income countries

Left photo: The judges greet Team Sali, Andrea Relucio and Joel Alejandro, from the Philippines. Pictured from left: Richard Francis, Roberto Ascione, Dr. Harald Nusser and Fredrik Debong.

Right photo: Finalists listen to mySugr founder Fredrik Debong (center), who says that only 1% of entrepreneurs succeed – but that didn’t stop him. Pictured from left: Priscilla Abu-Darko, Lebene Soga, Abrar Ahmad, Benedikt Schmidl, Debong and Yameen Rasheed.

The runners-up

Here are the other three finalist teams from Sandoz HACk in London:

MedMee (Pakistan), Saif Ali, Abrar Ahmad
MedMee will put digitalized medical records in patients’ hands, and use a chatbot to advise people on how and when to take their medicines. The aim is to reduce medication errors.

PillDrop (South Africa), Johannes Mangane
PillDrop is a mobile platform that connects patients with motorists who can pick up and deliver medications to patients in remote areas. It saves patients from excessive travel time and costs.

SALMON (Germany), Benedikt Schmidl, Tanja Schwarzmeier
Using questions based on screening tests such as the Harvard Trauma Questionnaire, the SALMON app (“See All Lives – Mental Health Organizing Networks”) will help to detect severe psychiatric stress disorders among Germany’s refugee population. In this way, refugees can get help, which will later enable integration.
Bacteria growing in a petri dish. Methicillin-resistant Staphylococcus aureus (MRSA) are particularly troublesome.
Bacterial resistance to antimicrobials could cause ten million deaths per year by 2050.

Human white blood cells (shown in blue) trying to destroy resistant *Staphylococcus aureus* bacteria (in gold).
Facing antibiotic resistance

Many common antibiotics can become ineffective against certain resistant bacteria. This problem, above all in hospitals and clinics, is fast becoming a global issue. Identifying the factors and educating the public are the keys to addressing resistance.
The Sandoz commitment to the future of antibiotics

At Sandoz, we discover new ways to improve and extend people's lives. We pioneer novel approaches to help people around the world access high-quality medicine. This is how we contribute to improving society's ability to support growing healthcare needs. Increasingly challenging in this context is the advance of antimicrobial resistance (AMR).

As part of the Novartis group, the Sandoz Anti-Infectives organization is leading the way when it comes to AMR. Our leadership position gives us the opportunity to remind people not only about the importance of antibiotics but also about using them responsibly. Therefore, we strongly support stewardship practices promoting the rational and appropriate use of antibiotics. In order to tackle the root causes of AMR, Sandoz is committed to working with other stakeholders.

We are determined not only to ensure stable manufacturing and secure supply of antibiotics but also to understand the mechanisms underlying the occurrence of AMR as well as to research and develop novel antibiotics that cure the most prevalent nosocomial and opportunistic infections. The adoption of novel formulations and incremental innovations is also an essential part of our work. Therefore, the Novartis Group supports the “Innovative Medicines Initiative” of the EU, which invests EUR 344 million into antimicrobial resistance measures and activities.
Ten million people could be in harm’s way around the world. By 2050, infections could kill this many people – every year – if antimicrobial resistance continues to spread. This prediction comes from British economist Jim O’Neill, in The Review on Antimicrobial Resistance. As he and other experts warn, modern medicine must remain vigilant in face of the silent threat. Certain microbes have developed resistance to formerly effective medicines. They have become stronger than people’s attempts to get rid of them. Nearly 2,000 people per day already die from drug-resistant microbial infections. Margaret Chan, Director General of WHO, fears a “post-antibiotic era in which common infections will once again kill.”

For nearly a century, we have relied upon antibiotics. In the search for a remedy against bacteria that cause diseases and illness, Alexander Fleming is celebrated as a hero. In 1928, Fleming observed that fungus molds could kill bacteria. By 1941, compounds from the penicillin fungus were used to treat bacterial infections. Thanks to these antibiotics, doctors could also treat bacterial infections that were once deadly.

Within a few years, the first cases of penicillin resistance – carried by Staphylococcus aureus – appeared. Scientists then developed a new weapon, the antibiotic methicillin – a chemically-modified penicillin. But bacteria soon developed resistance to methicillin as well. Dr. Michael Borek, M.D., Therapeutic Area Head Medical Office at Sandoz, is not surprised at bacteria’s resilience. “The more antibiotics in use, the higher the likelihood of resistance,” he says.

**Microbes versus medicine**

How could resistance become so strong? Borek suggests the answer is found in the underlying evolutionary mechanism: “When the addition of an antibiotic to a population creates selection pressure, those strains that are resistant to it are favored.” People take penicillin, for example, but not all of the bacteria in the body are killed. Some of the microbes adapt, and the next generation survives future attacks from the same drug. The patient, or a healthcare worker, might unknowingly pass on the resistant bacteria to other people.

And it’s not just bacteria that are adapting to medicine. Other microorganisms, including certain viruses and parasites, are also becoming resistant to antibacterial, antifungal, antiparasitic and antiviral therapies. Together, these drugs – known as antimicrobials – are leading to the overall problem of antimicrobial resistance.

To avoid the development of resistance in microbes, it is critical that people realize how important it is to use antibiotics responsibly. Physicians and healthcare workers need to employ stewardship practices that lead to rational and appropriate use of antibiotics. Sandoz is strongly committed to manufacturing and operating responsibly, to understanding the root causes of antimicrobial resistance and determined to ensure a secure supply of antibiotics.

One prominent bacterium, methicillin-resistant Staphylococcus aureus (MRSA), is well known for its capability to withstand antibacterial drugs – and for causing infections in hospital patients. Such infections result in longer hospital stays and are deadlier than other types of infection because they are so difficult to treat. Unfortunately, the variety of resistant pathogens has also grown, and they are proving particularly dangerous in hospitals.

**Gram-negative bacteria are of most concern**

Borek explains that there are two groups of bacteria identifiable by a chemical method. When it is possible to stain the bacteria with a certain dye, these are called Gram-positive. The other group is Gram-negative. For the past three-quarters of a century, medicine primarily has fought Gram-positive bacteria such as *Staphylococcus aureus*. However, Gram-negative bacteria, including certain *Enterobacteriaceae* species and *Pseudomonas aeruginosa*, are causing serious infections and showing increasing resistance.

Today, Gram-negative bacteria are increasingly responsible for hospital-acquired infections. Especially in intensive care units, the density of such microbes is high, and the resulting infections are very difficult to treat. In 2014, WHO found high levels of resistance worldwide in seven common pathogens – five of them were Gram-negative.
Measures to avoid resistance
But microbes haven’t won yet. “Spreading knowledge and awareness to the public is an important step to slow down the rise of antimicrobial resistance,” explains Borek. This includes reducing overprescription and use in nonbacterial infections. And sometimes not using antibiotics is the best solution of all. “We want to provide the public with safe and effective antibacterial drugs. At Sandoz, we have a large portfolio that enables physicians to use a variety of antibiotics to treat bacterial infections.” This way, microbes do not develop resistance to drugs they have been exposed to regularly.

With rapid diagnostics, physicians could reduce the use of broad-spectrum antibiotics, often a first-line therapy against the most probable pathogens. “A revolution would be the species-specific treatment of the causative bacteria of an infection. For this to occur, it would be necessary to identify the microbes immediately; Borek adds. This way, physicians would not have to wait for the results of a laboratory analysis, which often takes a day or more. They could start a targeted therapy as first-line treatment.

While the rate of resistance can be slowed, evolution never stops. Sooner or later, people will need new drugs. But alternatives have been slow in coming. Between 2002 and 2012, the US Food and Drug Administration approved just seven new antibiotics, four of which showed adverse effects or were later withdrawn from the market. Yet new medicines are on the way. Since 2013, six new antibiotics have been introduced, perhaps encouraged by an initiative from the Infectious Diseases Society of America to create ten systemically administered antibiotics by 2020.

According to antibiotics expert Borek, novel active substances play a key role. “We collaborate closely with our parent company Novartis. There’s an upward trend in the development of antibacterial substances.” Novel formulations of existing antibiotics could provide alternatives. They are more targeted, which makes therapy more effective. They can also reduce side effects and increase the chance that the patient completes therapy.

New strategies
Researchers continue to search for new treatment methods. Using antibodies that specifically target a pathogen is one new way to deal with resistant bacteria. The protein complexes lead to inactivation of the bacterium or its toxins, for example. Other therapy options include probiotics and vaccines. Innovation could produce effective alternatives for antibacterial therapy in future. Antibiotic expert Borek is seeing a lot of new ideas and approaches. As a result, he remains optimistic: “I’m not expecting a post-antibiotic apocalyppe in the coming years.”
Addressing antimicrobial resistance

Antibiotics are often overprescribed by physicians and veterinarians. Antimicrobial stewardship is a set of strategies to fight antimicrobial resistance. Simple steps can help defeat “superbugs” and save lives. Here’s how:

**Diagnose quickly**
Employ rapid diagnostics to reduce the use of broad-spectrum antibiotics. Identify pathogens and start species-specific therapy immediately.

**Prevent overuse**
Prescribe fewer doses of antibiotics and avoid repeat prescriptions. Adjust the dosage, or narrow the antibiotic spectrum, to reduce side effects.

**Educate the public**
Bacteria become resistant, not people or animals. Patients should always complete antibiotic therapies, never share antibiotics or use leftover doses.

**Choose well**
Use a targeted therapy. Prescribe novel formulations of existing antibiotics or switch antibiotics for the next line of defense.

**Monitor**
Use good hygiene practices to avoid infections in the first place. Observe patients closely, and track and report resistance patterns.

Data based on 26 studies (six months to three years) that show hospital antimicrobial stewardship significantly decreases use and cost of antimicrobials. Other benefits include fewer antimicrobial-resistant infections and shorter hospital stays.

Source: Karanika et al; Clinical and Economic Outcomes from the Implementation of Hospital-based Antimicrobial Stewardship Programs. A Systematic Review and Meta-Analysis; Antimicrobial Agents and Chemotherapy; 2016
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